

NOTES ON VAUCHERIA LONGICAULIS HOPPAUGH

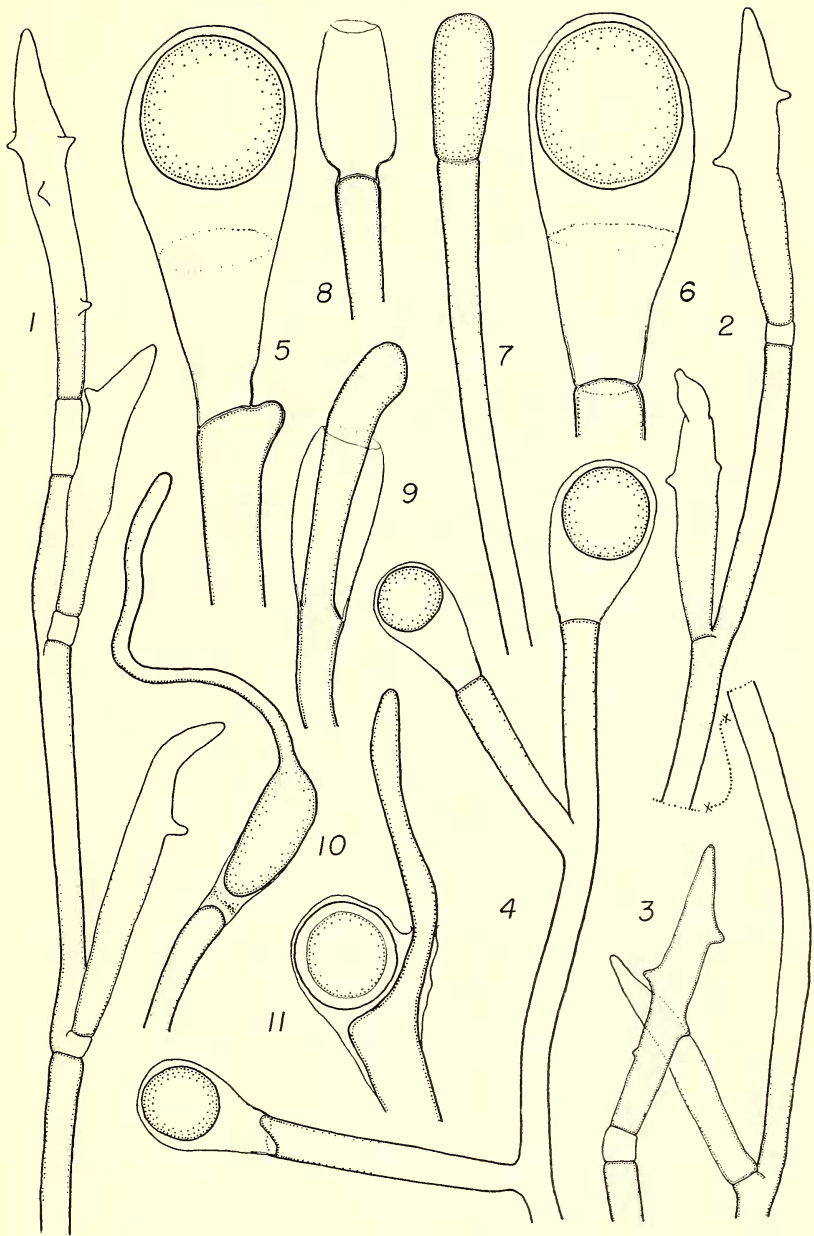
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In 1930 Dr. K. M. Hoppaugh described a large species of *Vaucheria* from Elkhorn Slough in Monterey County, California, as *V. longicaulis*, and treated it as a member of the Pilobolidae most closely related to *V. litorea* C. Agardh. The present writer, needing material for comparison with Bermudian species in the same section of *Vaucheria*, asked Professor George J. Hollenberg of Redlands University to collect specimens from the type locality, which he most kindly did in the summer of 1951. The plant is reported as essentially marine, growing partly embedded in a very muddy bank which is exposed by the considerable tidal flow at low water, and probably receives little river water in the summer. The original description is brief and lacks some important details, such as the oospore dimensions; Dawson (1946) accepts only *V. litorea* as found in marine locations on the west coast. The following notes are offered as supplementary to the type description and as confirmatory of the distinctive character of the species.

The filaments of this plant seem rather loosely associated, not matted, sparingly branched and generally 45–72 microns in diameter, somewhat thicker than the 33–60 microns of the original description. Sporangia are present, presumably aplanosporangia, since such rather than zoosporangia are reported in this section of the genus. They terminate straight branches which increase in diameter very gently for a long distance below the tip, where transverse walls isolate the cylindrical to obovoid spores (fig. 7), which are generally liberated by dissolution of the distal sporangium wall (fig. 10). In one instance the filament proliferated through the sporangium wall (fig. 9). No considerable number of sporangial measurements was made, but it was evident that they were smaller than the oogonia, reaching about 90–120 microns in diameter, and 225 microns in length. None was seen with a thick spore wall.

The sexual filaments are dioecious, as originally described. The antheridia are formed terminally and laterally in small series (figs. 1, 2) and are usually but not always separated from the filament by hyaline supporting cells, which are absent from the two lower antheridia in figure 2, but present below the terminal one. They approximate the diameter of the fila-

FIGS. 1-11. *Vaucheria longicaulis*: 1, 2, terminal portions of male filaments, the antheridia showing various numbers of discharge papillae $\times 73$; 3, a single antheridium $\times 73$; 4, terminal portion of a branched female filament showing three oogonia $\times 73$; 5, 6, oogonia with mature oospores $\times 147$; 7, young sporangium terminating a filament $\times 92$; 8, empty sporangium $\times 92$; 9, proliferation of a filament through the base of an empty sporangium $\times 92$; 10, germination of an aplanospore *in situ* $\times 73$; 11, proliferation of a filament through the base and side of an abnormal oogonium $\times 110$.



FIGS. 1-11. *Vaucheria longicaulis*.

ment and vary from half to three times this in length. The antheridia are spindle-shaped, usually largest at the middle or a little above, in diameter 60–90 microns, averaging 78 microns exclusive of the papillae, and in length 450–680 microns, averaging 551 microns, thus much wider than cited by Hoppaugh (45–60 microns), whose maximum is no greater than the filament diameter she describes. Those in our plants always exceeded the diameter of the supporting filament. The discharge papillae are conical, not as tubular as in some Pilobolidae, and in number rather less than she cited, usually three or four.

The oogonia are terminal on leading axes, or at the end of lateral branches about twice the length of the oogonia. They quickly become pyriform (figs. 4–7), and the sharp expansion toward the distal end makes it easy to distinguish them from sporangial rudiments when young. In no instance was a special basal cell seen, nor were the rather long branches bearing the oogonia at all recurved. These were the chief characters offered by Hoppaugh to separate *V. longicaulis* from *V. litorea*, and they seem quite constant. Our measurements give the range in length as 242–430 microns and the average as 360 microns, the width as 140–200 microns and the average as 160 microns; this agrees well with her figures for length of 275–440 microns, but our average width is much over her mean of 137 microns. There frequently may be seen a scar, part way up the empty oogonium, similar to that noted by the writer in other Pilobolidae (figs. 5, 6). The distal fertilization pore does not remain distinct. The oospore protoplast withdraws completely from the oogonial wall and forms its own spore wall free from the sac. The spores have firm but rather thin brown walls, and may be either spherical or slightly oval. They are quite free from the oogonial wall (figs. 5, 6), though they sometimes touch it. This is in contrast to the condition in *V. piloboloides*. The width varies from 115–165 microns, the average being 141 microns, the length 130–200 microns, the average 163 microns. Dr. Hoppaugh did not consider the oospore dimensions reliable and gave no measurements, but the writer found them as good as any other measurements. Occasionally a very thick colorless refractive wall was seen, reaching 11–15 microns in thickness, but this seemed abnormal (fig. 11). The example drawn also happened to show a proliferation of the filament into the oogonium through the base, and out the side.

Whereas the absence of the special supporting cells and straight rather than recurved oogonial branches suffice to distinguish *V. longicaulis* from *V. litorea*, we may also note that there are size differences between respective organs of these species. These generalities are based on an inspection of a number of references to *V. litorea* (Brown 1929, Collins 1909, DeToni 1889, Farlow 1881, Hamel 1930–31) although when one

compares individual descriptions of *V. litorea* with each other one finds considerable variation. The most marked disagreement comes with the description and figure given by Newton (1931, p. 104, fig. 68B-D), whose cited dimensions for the antheridia of 55-65 microns would make them slenderer than the filaments, given as 70-95 microns, although she figures them as wider. Perhaps her description "oogonium almost spherical, 190-450 microns in diam." refers to the oospore, since she figures the oogonium as a clavate structure (fig. 68D), though one must observe that 450 microns is unexpectedly long, even for the longer diameter of these oospores, more in line with the longer dimensions given for oogonia (DeToni 1889). However, we may accept it that the filaments and the antheridia of *V. litorea* are in general distinctively more slender than in *V. longicaulis*, the oogonia are not very different in size, but the oospores are considerably smaller.

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LITERATURE CITED

- BROWN, H. J. 1929. The algal family Vaucheriaceae. Trans. Am. Micr. Soc. 48(1):86-117, pl. 15-20.
- COLLINS, F. S. 1909. The green algae of North America. Tufts College Stud. 2(3):79-480, pl. 1-18.
- DAWSON, E. Y. 1946. A guide to the literature and distribution of the marine algae of the Pacific Coast of North America. Mem. So. Calif. Acad. 3(1):1-134.
- DETONI, J. B. 1889. Sylloge algarum omnium hucusque cognitarium. Vol. 1 (Sylloge Chlorophycearum). Pp. 1-12 + I-CXXXIX + 1-1315.
- FARLOW, W. G. 1881. The marine algae of New England. Rep. U.S. Comm. Fish and Fisheries for 1879, Appendix 1-A. Pp. 1-210, 15 pl. 1882.
- HAMEL, G. 1930-31. Chlorophycées des Cotes francaises. Revue Algol. 5:1-54, figs. 1-19, 383-430, figs. 20-33, 1930-31; *ibid.*, 6:9-73, figs. 34-51. 1931.
- HOPPAUGH, K. W. 1930. A taxonomic study of species of the genus *Vaucheria* collected in California. Am. Jour. Bot. 17:329-347, 4 text figs., pl. 24-27.
- NEWTON, L. B. 1931. A handbook of British seaweeds. British Museum (N.H.), London. 478 pp., 270 figs.

CAREX DIVERSISTYLIS, A NEW SPECIES FROM OREGON

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Carex diversistylis sp. nov. Caules quam folia breviores glabri ca. 10 cm. alti e rhizomatibus brevibus. Paginae foliorum 1.5 — 2.5 mm. latae. Spicae masculae solitariae 7 — 9 mm. longae 1.5 mm. latae; spicae feminae 2 — 4 infimae folio suffultae; flosculis 4 — 8; perigynia 2 — 3 mm. longa valde stipitata pubescentia orbiculata elliptica bicarinata ceterum enervata rostro abrupto 1 mm. longo apice vix bidentato;